

REMARKS/ARGUMENTS

Applicants thank the Examiner for careful review of this application. A Request for Continued Examination (RCE) is being filed under 37 CFR § 1.114 for U.S. Patent Application Number 10/077,072 filed on February 14, 2002. The Applicants submit this Preliminary Amendment in response to the Final Office Action, dated June 19, 2003 issued in the Application. Claims 1-19 are pending after entry of the present Preliminary Amendment. Claims 1, 13, 18 have been amended but do not introduce new matter. Claims 20 and 21 have been canceled. Claim 22 has been added as dependent on claim 13. Applicants respectfully request reconsideration of the application in view of the amendments and additions and the following remarks submitted in support thereof. Amendments to the specification contain no new matter. All amendments draw support from the prior filed specifications and drawings. Figures 2-5 clearly illustrate a confined area or volume defined within the confinement rings and above the ground extension. Additionally in describing Figure 2, page 15 lines 19-23 state, "At least one confinement ring 166 is used to confine the plasma to the volume defined by the confinement rings. Additional confinement rings 168a and 168b are also shown. The confinement rings provide confinement to the plasma that is generated within the processing chamber." Therefore a ground potential exists within the region defined by the rings.

Rejections under 35 U.S.C. § 102(b):

Claims 1, 2, 6-15, 18 and 19 and were rejected under 35 U.S.C. 102(b) as being anticipated by Li et al. (U.S. Patent Number 6,178,919, hereafter "Li"). This rejection is respectfully traversed. Although the claims in their original state are submitted to be patentable over Li, claims 1, 13, and 18 have been amended to more clearly define the claimed invention. For the reasons put forth below, Applicants respectfully submit that Li fails to disclose each and every element of the claimed invention, as defined in independent claims 1, 13, and 18.

Li teaches a plasma reaction chamber configured to generate and confine a plasma. Li teaches top and bottom electrodes, both of which may be powered by RF sources.

Additionally, Li teaches a perforated plasma confinement ring 222 located adjacent to or below the level of the wafer in order to reduce pumping conductance in the port 226 between the bottom electrode 210 and the interior wall 202 of the chamber (column 5 lines 20-23). Li teaches the use of an insulating shroud 220 to further confine plasma from the chamber walls (column 5 lines 16-17). The design of Li involves the use of a variable gap system in which the upper electrode is capable of moving vertically and of having very narrow clearance over the wafer during processing (column 5 lines 39-45). The insulating shroud 220 taught by Li is positioned outboard of the bottom electrode 210 as it moves vertically in a variable gap system (Li Figure 3). The insulating shroud 220 is used to prevent polymer buildup mainly consisting of etch byproducts on the chamber walls. The configuration taught by Li has walls of the chamber which are grounded. Li also teaches use of an optional top shroud 208 surrounding the top electrode 204.

In contrast, claim 1 of the present invention describes a processing chamber comprised of two electrodes, a first powered electrode and a second electrode disposed at a distance from the first. The perforated plasma confinement ring 222 taught by Li is distinct in form from the confinement rings of the present invention which surround a volume within which the confined plasma is disposed. The purpose of confinement rings is to confine the plasma within the area over the wafer and to impede diffusion of charged species to the walls. It is undesirable for plasma to extend beyond the confined region. Unconfinement can sufficiently disrupt RF distribution, in some cases causing device failure on the wafer. The perforated plasma confinement ring taught by Li is a single solid ring with perforations in or beneath the plane of the lower electrode whereas the claimed invention provides a plurality of confinement rings surrounding a volume within that is above the lower electrode. Claim 1 provides a combination of confinement rings extending in a vertical direction and a ground extension in the plane of the wafer.

Additionally, in claim 1 of the present invention, there is a ground extension adjacent to the lower electrode that has surface area within the volume defined by the confinement rings (see figures 2, 3, 4, and 5), thus attracting electrons. In the configuration taught by Li, the electrons would be attracted to the walls of the chamber or the perforated confinement ring outside of the area above the bottom electrode. As a practical consequence of the ground extension in the present invention, charged species do not see the chamber walls as ground. Functionally the ground extension operates within confinement rings and beneath the upper

not in claims

electrode, whereas Li teaches a perforated confinement ring 222 that sits directly below a top shroud 208. It is submitted that Li fails to teach or suggest use of a combination of confinement rings defining a volume within and a ground extension within that volume confined over the wafer. Further, claim 1 provides for a ground extension that lies generally in a plane parallel to the workpiece in contrast to the chamber wall of Li that is perpendicular to the workpiece. The ground extension of the claimed invention offers a significant improvement in electrical confinement of elements of the plasma.

In summary, the electrode configuration, the RF circuit, the confinement rings and the ground extension of claim 1 of the Applicant's invention are not taught by Li. Accordingly, claim 1 is submitted to be patentable over Li as Li fails to teach each and every element of the claimed invention. Claims 2-12 each of which depend from claim 1, are likewise patentable over Li for at least the same reasons set forth above for claim 1. Withdrawal of the rejection is respectfully requested.

Claim 13 was also rejected under 35 U.S.C. 102(b) as being anticipated by Li. The rejection is respectfully traversed. Applicants respectfully submit claim 13 is patentable over Li in that Li fails to teach a ground extension within the volume confined by the confinement rings (discussed above). Claims 14-17 each of which depend from claim 13, are likewise patentable over Li for at least the same reasons set forth above for claim 13. Withdrawal of the rejection is respectfully requested.

Claim 18 was rejected under 35 U.S.C. 102(b) as being anticipated by Li. Li fails to disclose significant aspects of the present invention. In particular, claim 18 describes a method of generating a confined plasma in a plasma processing chamber comprised of a plurality of confinement rings surrounding a volume within which the confined plasma is disposed, a first electrode larger than a second electrode, a RF power supply, and a ground extension adjacent to the lower electrode and within the confinement volume to drain charge from the plasma. Li fails to teach a ground extension adjacent to the lower electrode that, as shown in Figures 2-5, has exposed area within the volume defined by the rings directly above the wafer surface. In claim 18 of the present invention, the ground extension serves as the closest electrical path for the plasma contained within the interior space bounded by the rings (discussed at length above). Claim 19, which depends from claim 18, is likewise patentable

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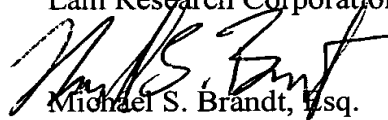
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over Li for at least the same reasons set forth above for claim 18. Withdrawal of the rejection is respectfully requested.

In view of the foregoing, the Applicants respectfully submit that all the pending claims are in condition for allowance. Accordingly, allowance is respectfully requested. If the Examiner has any questions concerning the present Preliminary Amendment, the Examiner is kindly requested to contact the undersigned at (510) 572-1667. If any additional fees are due in connection with filing this Amendment, the Commissioner is also authorized to charge Deposit Account No. 50-1842 (Order No. P0877). A duplicate copy of the transmittal is enclosed for this purpose.

Respectfully submitted,
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